

WHAT IS CLAIMED IS:

1. An image processing apparatus comprising:
  - a converting unit that performs color conversion of input data,  
wherein the input data is color data obtained from measurement of a  
5 color chart of an image;
  - a storage unit that stores the conversion data and history  
information on the measurement of the color chart;
  - an arithmetic unit that compares the history information with  
information on the measurement of the color chart to determine number  
10 of color patches; and
  - an updating unit that updates the printer profile based on the  
number of color patches.
2. The image processing apparatus according to claim 1, wherein  
15 the information on the measurement of the color chart includes the  
color data, number of times of the measurement, and color regions at  
the time of the measurement.
3. The image processing apparatus according to claim 1, wherein  
20 the converting unit includes a table for converting multi-dimensional Lab  
values into one-dimensional vector values.
4. The image processing apparatus according to claim 1, wherein  
the arithmetic unit determines the number of color patches based on an  
25 evaluation standard, wherein the evaluation standard includes a newly

measured patch value and an average of patch values previously measured and stored as the history information.

5. The image processing apparatus according to claim 1, wherein  
5 the arithmetic unit determines the number of color patches based on an evaluation standard, wherein the evaluation standard includes a newly measured patch value and a patch value measured last time and stored as the history information.

10 6. The image processing apparatus according to claim 1, wherein the arithmetic unit compares a first difference with a second difference, wherein  
the first difference is a difference between a newly measured patch value and a patch value measured last time and stored  
15 as the history information, and  
the second difference is a difference between the newly measured patch value and an average value of the patch values previously measured and stored as the history information, and  
when the first difference is equal to or greater than the second  
20 difference, the arithmetic unit determines the number of color patches based on a third difference, wherein the third difference is a difference between the newly measured patch value and a patch value measured last but one.

7. The image processing apparatus according to claim 1, wherein  
the arithmetic unit compares a first difference with a second  
difference, wherein

the first difference is a difference between a newly  
5 measured patch value and a patch value measured last time and stored  
as the history information, and

the second difference is a difference between the newly  
measured patch value and an average value of the patch values  
previously measured and stored as the history information, and

10 when the first difference is less than the second difference, the  
arithmetic unit determines the number of color patches based on a third  
difference, wherein the third difference is a difference between the  
newly measured patch value and a measured patch value having a  
minimum difference from a representative vector indicating a  
15 representative color.

8. The image processing apparatus according to claim 4, wherein  
the evaluation standard is a predetermined value obtained for each  
neighborhood of whole color regions that constitute a profile.

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9. The image processing apparatus according to claim 8, wherein  
the evaluation standard is a value obtained by combining a first  
distance, a second distance, and a third distance obtained for each  
neighborhood of the whole color regions, wherein

25 the first distance is a distance between Lab values obtained

from measuring the color patch and Lab values obtained from a reference white of an output medium, based on a color difference formula according to CIE1976Lab color system,

the second distance is a distance between the Lab values  
5 obtained from measuring the color patch and the Lab values obtained from the reference white, based on a color difference formula according to CIE1994 color difference system, and

the third distance is a difference between the first distance and the second distance.

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10. The image processing apparatus according to claim 4, wherein the evaluation standard is a predetermined value obtained for each neighborhood of representative colors including preset colors that constitute a profile.

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11. The image processing apparatus according to claim 10, wherein the evaluation standard is a value obtained by combining a first distance, a second distance, and a third distance obtained for each neighborhood of the representative colors, wherein

20 the first distance is a distance between Lab values obtained from measuring the color patch and Lab values obtained from a reference white of an output medium, based on a color difference formula according to CIE1976Lab color system,

the second distance is a distance between the Lab values  
25 obtained from measuring the color patch and the Lab values obtained

from the reference white, based on a color difference formula according to CIE1994 color difference system, and

the third distance is a difference between the first distance and the second distance.

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12. The image processing apparatus according to claim 11, wherein the representative colors are red, green, black, cyan, magenta, and yellow.

10 13. The image processing apparatus according to claim 9, further comprising a compressing unit that compresses the combined value.

14. The image processing apparatus according to claim 11, further comprising a compressing unit that compresses the combined value.

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15. The image processing apparatus according to claim 13, wherein the compressing unit compresses the combined value by vector quantization.

20 16. The image processing apparatus according to claim 14, wherein the compressing unit compresses the combined value by vector quantization.

17. The image processing apparatus according to claim 13, wherein  
25 the storage unit stores the compressed value.

18. The image processing apparatus according to claim 14, wherein the storage unit stores the compressed value.

19. The image processing apparatus according to claim 13, wherein  
5 the evaluation standard includes a reference vector for the compression of the combined value and an error occurring when the combined value is compressed.

20. The image processing apparatus according to claim 14, wherein  
10 the evaluation standard includes a reference vector for the compression of the combined value and an error occurring when the combined value is compressed.

21. An image processing system comprising:  
15 a server that updates a printer profile based on color data obtained from measurement of a color chart of an image; and  
a client that is connected to the server, wherein  
the server includes  
a converting unit that performs color conversion of the  
20 color data to produce conversion data;  
a storage unit that stores the conversion data and history information on the measurement of the color chart;  
an arithmetic unit that compares the history information with information on the measurement of the color chart to determine  
25 number of color patches; and

an updating unit that updates the printer profile based on the number of color patches, and

the client includes

a profile storage unit that stores a printer profile created  
5 by the server; and

a printer driver that converts input color data received from an application into output color data that can be interpreted by an image forming apparatus.

10 22. The image processing system according to claim 21, further comprising a measuring unit that measures the color chart to obtain Lab values, and outputs the Lab values to the client.

23. An image forming apparatus comprising:

15 a converting unit that performs color conversion of input data, wherein the input data is color data obtained from measurement of a color chart of an image;

a storage unit that stores the conversion data and history information on the measurement of the color chart;

20 an arithmetic unit that compares the history information with information on the measurement of the color chart to determine number of color patches;

a profile storage unit that stores a printer profile;

25 an updating unit that updates the printer profile based on the number of color patches; and

an image forming unit that forms a visible image on a medium.

24. A method of image processing comprising:

performing color conversion of input data, wherein the input data  
5 is color data obtained from measurement of a color chart of an image;  
storing the conversion data and history information on the  
measurement of the color chart;  
comparing the history information with information on the  
measurement of the color chart to determine number of color patches;  
10 and  
updating the printer profile based on the number of color  
patches.

25. The method according to claim 24, wherein the number of color  
15 patches is determined based on an evaluation standard, wherein the  
evaluation standard includes a newly measured patch value and an  
average of patch values previously measured and stored as the history  
information.

20 26. The method according to claim 24, wherein the number of color  
patches is determined based on an evaluation standard, wherein the  
evaluation standard includes a newly measured patch value and a  
patch value measured last time and stored as the history information.

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27. The method according to claim 24, wherein the comparing includes

comparing a first difference with a second difference, wherein

the first difference is a difference between a newly

5 measured patch value and a patch value measured last time and stored as the history information, and

the second difference is a difference between the newly measured patch value and an average value of the patch values previously measured and stored as the history information; and

10 determining the number of color patches based on a third difference, when the first difference is equal to or greater than the second difference, wherein the third difference is a difference between the newly measured patch value and a patch value measured last but one.

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28. The method according to claim 24, wherein the comparing includes

comparing a first difference with a second difference, wherein

the first difference is a difference between a newly

20 measured patch value and a patch value measured last time and stored as the history information, and

the second difference is a difference between the newly measured patch value and an average value of the patch values previously measured and stored as the history information; and

25 determining the number of color patches based on a third

difference, when the first difference is less than the second difference, wherein the third difference is a difference between the newly measured patch value and a measured patch value having a minimum difference from a representative vector indicating a representative color.

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29. The method according to claim 25, wherein the evaluation standard is a predetermined value obtained for each neighborhood of whole color regions that constitute a profile.

10 30. The method according to claim 29, wherein the evaluation standard is a value obtained by combining a first distance, a second distance, and a third distance obtained for each neighborhood of the whole color regions, wherein

the first distance is a distance between Lab values obtained  
15 from measuring the color patch and Lab values obtained from a reference white of an output medium, based on a color difference formula according to CIE1976Lab color system,

the second distance is a distance between the Lab values  
obtained from measuring the color patch and the Lab values obtained  
20 from the reference white, based on a color difference formula according to CIE1994 color difference system, and

the third distance is a difference between the first distance and the second distance.

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31. The method according to claim 25, wherein the evaluation standard is a predetermined value obtained for each neighborhood of representative colors including preset colors that constitute a profile.

5 32. The method according to claim 31, wherein the evaluation standard is a value obtained by combining a first distance, a second distance, and a third distance obtained for each neighborhood of the representative colors, wherein

the first distance is a distance between Lab values obtained  
10 from measuring the color patch and Lab values obtained from a reference white of an output medium, based on a color difference formula according to CIE1976Lab color system,

the second distance is a distance between the Lab values  
obtained from measuring the color patch and the Lab values obtained  
15 from the reference white, based on a color difference formula according to CIE1994 color difference system, and

the third distance is a difference between the first distance and the second distance.

20 33. The method according to claim 30, further comprising compressing the combined value.

34. The method according to claim 32, further comprising compressing the combined value.

35. The method according to claim 33, wherein the evaluation standard includes a reference vector for the compression of the combined value and an error occurring when the combined value is compressed.

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36. The method according to claim 34, wherein the evaluation standard includes a reference vector for the compression of the combined value and an error occurring when the combined value is compressed.

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37. A computer program that makes a computer to execute;  
performing color conversion of input data, wherein the input data is color data obtained from measurement of a color chart of an image;  
storing the conversion data and history information on the  
15 measurement of the color chart;  
comparing the history information with information on the measurement of the color chart to determine number of color patches;  
and

20 updating the printer profile based on the number of color patches.